

Photochemical Cyclopolymerization of Polyimides in Ultraviolet Rigidizing Composites for Use in Inflatable Structures, Phase I

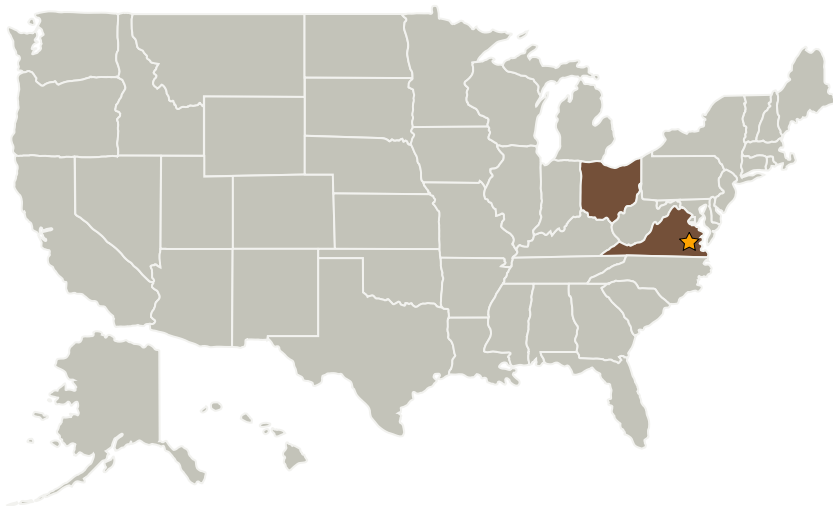
Completed Technology Project (2006 - 2006)



Project Introduction

This innovation uses photochemical cyclopolymerization of polyimides to manufacture ultraviolet rigidizable composites for use in RIS (rigidizing inflatable) structures. Sunlight initiated polymerization (UV polymerization) has been identified as a promising method for rigidizing composites for inflatable space structures. The use of in-situ polymerized polyimides will provide superior dimensional and dynamic properties to enhance the performance characteristics of RIS deployed space based structures such as antennas, solar arrays and sunshields. As a class, polyimide polymers are known to possess excellent physical and chemical properties superior to conventional thermoset resins. But polyimides are typically produced at very high temperatures, making their use as RIS materials impractical. By utilizing a unique chemistry and polymerizing in-situ with sunlight, a new rigidizable composite will be fabricated. The resulting polyimide impregnated composite can be rigidized in space and provide mechanical properties superior to those achieved with previous radiation cured composites. Stability of the polyimide precursors will permit long term storage of RIS prior to deployment. When produced in scale the composite will provide a cost competitive method of fabricating RIS and meet the growing demand for this type of space architecture. Terrestrial applications also exist in the homeland security and disaster response sectors.

Primary U.S. Work Locations and Key Partners



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Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission
Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation
Research/Small Business Tech
Transfer

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Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Advanced Coatings International	Supporting Organization	Industry	Akron, Ohio

Primary U.S. Work Locations

Ohio	Virginia
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.1 Materials
 - └ TX12.1.6 Materials for Electrical Power Generation, Energy Storage, Power Distribution and Electrical Machines